

Claims

1. A method for operating one or more electrolysis cells (43, 154, 243) for production of aluminium, the cell comprising inert or substantially inert anodes, where an oxygen containing gas (21, 126, 221) evolved by the electrolysis process in the cell is gathered and removed therefrom,  
characterised in that  
the oxygen containing gas is introduced into a combustion chamber (38, 149, 238) where it is reacted with a carbon containing gas (7, 116, 209) in a combustion process.
2. A method in accordance with claim 1,  
characterised in that  
at least one part of the reaction process stream (8, 117, 210) from the combustion chamber (38, 149, 238) is used in an energy conversion process.
3. A method in accordance with claim 2,  
characterised in that  
the energy conversion process comprising expansion of the reaction process stream in a gas-turbine for conversion of energy to mechanical energy.
4. A method in accordance with claim 3,  
characterised in that  
the gas-turbine is arranged to drive a generator for the production of electricity, preferably for use in the electrolysis cell.
5. A method in accordance with claim 2-4,  
characterised in that  
at least one part of the reaction process stream (8, 117, 210) containing CO<sub>2</sub> is used as sweep gas in the electrolysis cell (43, 154, 243), preferably after being dried (20, 123, 220) in a drying process step.
6. A method in accordance with claim 2,  
characterised in that  
at least one part of the reaction process stream (8) is directed into a permeate side (34) of a mixed conducting membrane system (32) to pick up oxygen from an air stream through a retentate side (33) of the membrane system, where said oxygen enriched stream (10) is directed back to the combustion chamber (38).

7. A method in accordance with claim 2,  
5 characterised in that  
at least one part of a reaction process stream (109) from a second combustion chamber (144) is directed into a permeate side (147) of a mixed conducting membrane system (145) to pick up oxygen from an air stream through a retentate side (146) of the membrane system, where said oxygen enriched stream (111) is directed back to said  
10 combustion chamber (144), and where an other part of the reaction process stream (109) is directed to said first combustion chamber (149).
8. A method in accordance with claim 1,  
characterised in that  
15 said carbon containing gas (209) is derived from a fuel cell (234).
9. A method in accordance with claim 1-8,  
characterised in that  
substantially all parts of CO<sub>2</sub> evolved is recovered and deposited.  
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10. A method in accordance with claim 1-8,  
characterised in that  
formation of NO<sub>x</sub> is substantially avoided.
- 25 11. A method in accordance with claim 1,  
characterised in that  
thermal energy in streams (5, 106, 205, 15, 118, 215) is recovered by vaporisation of water, whereby generated steam is utilised to generate electric power in one or more steam turbines.
- 30 12. A method in accordance with claim 1,  
characterised in that  
the oxygen containing gas (21, 126, 221) is cleaned by removal of dust, electrolyte particles and fluoride vapours before it is applied in the combustion chamber.